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"Lieh Ying"-

THE CHINESE-BUILT LY-60 SURFACE-TO-AIR MISSILE WEAPON SYSTEM

by

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*"Lieh Ying"* —

### The Chinese-built LY-60 Surface-to-Air Missile Weapon System

Author: An Hua

At the weapons exhibition held in Greece in October, 1994, the China Precision Machinery Import-Export Corporation [CPMIEC] put the Chinese-built *"Lieh Ying"* ["Falcon"] LY-60 surface-to-air missile weapon system on display for the first time. This indicated that this system has become a new member of China's series of antiaircraft missiles, and will compete in the international marketplace.

#### Weapon System

*"Lieh Ying"* is a low-to-middle altitude surface-to-air missile system, primarily used for intercepting highly maneuverable, low-flying invading fighters, bombers, armed helicopters, and

other aerial targets, as well as air-to-surface missiles and low-flying sea missiles.

The whole system is composed of missiles, combat equipment in launching positions, and technological support equipment in technological positions. Combat equipment comprises: one search-and-monitoring radar vehicle, three tracking beam radar vehicles, six missile-launching vehicles, and a power supply vehicle. Technological support equipment includes: freight-loading vehicles, missile-testing vehicles, electronics maintenance vehicles, electromechanical maintenance vehicles, tool vehicles, spare part and instrument vehicles, and power supply vehicles.

Because this system uses microprocessors and intelligent modular technology, it has become a command and control system with artificial jamming capability. At present, this technology is at a world advanced level. Other low-to-middle altitude surface-to-air missile systems lack this technology.

This weapon system has the following fundamental characteristics:

- has an advanced fire control system, a high level of automation, and a system reaction time of nine seconds;
- has radar which uses moving target tracking processing and frequency agility technology, which gives the system good ability to counter active and passive jamming. Even in complex electromagnetic environments where it is difficult to determine the target's slant range, the system can still be used effectively;
- is capable of dealing with multiple targets. The system can process 40 batches of targets simultaneously, track

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the most threatening 12 batches of targets, and attack three batches of targets;

- is highly mobile, convenient and flexible to deploy, suited for antiaircraft field operations;

- has multiple functions, and can be organized into surface-to-air, ship-to-air, or combined cannon firepower units;
- has firepower coverage between that of antiaircraft guns and middle-to-long range missiles, and can carry out firepower linking and coordination functions;
- can be used for day and night operations in all weather;
- missiles are small and light, and have a large interception range for point and area defense;
- easy to maintain and support, can be overhauled on the battlefield.

### ***"Lieh Ying"* Missiles**

*"Lieh Ying"* missiles are newly developed by China and have a large interception range and good low-altitude performance. Today, they are among the more advanced antiaircraft missiles of this type in the world.

*"Lieh Ying"* missiles use semi-active radar homing, and have a high level of homing accuracy, a good splinter effect, and a single-shot kill probability of 60 to 70 percent. They are rapid-fired through multiple launch tubes. The missiles have cylindrical bodies, are 3.89 meters long, have front-end diameters of 203 millimeters and rear-end diameters of 208 millimeters. They have two pairs of fully movable wings and four fixed tail fins with a wingspan of 680 millimeters. The wings' and fins' aerodynamic placement is an X-X pattern (see figure 1). The missiles weigh 220 kilograms each, their maximum maneuvering overload is 35g, and their maximum flight speed is Mach 3. Their maximum flight speed for intercepting targets is 600 meters per second, and maximum [interception] maneuvering overload is 7g. Their interception range is an altitude of 30 to 12,000 meters, slant range is 1000 to 18,000 meters, and maximum angle of elevation is 60 degrees.

*"Lieh Ying"* missiles are made up of homing modules, a warhead compartment, a control module, and an engine compartment (see figure 2).

- The homing modules contain the homing head, the fuse, the radar antenna cover

(cowling), and the power supply.

- The warhead compartment contains prefabricated shell fragments (steel balls), the warhead, the detonating circuit, and the safety device.
- The control module includes the autopilot, the electronic hydraulic device, the servo system, the [frequency] mixer for the receiver behind the homing head, the four movable wings, the dropout plug, and the forward suspension device located on this part of this missile.
- The engine compartment includes a single-stage solid rocket engine, four fixed tail fins, the ignition plug, and the rear suspension device located on this part of the missile.

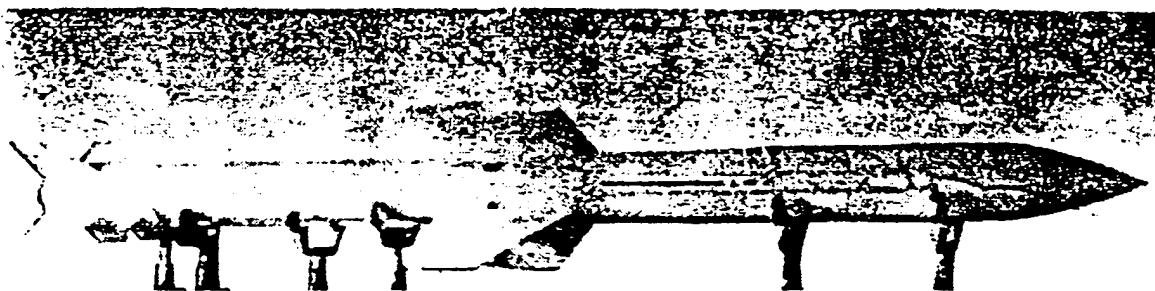
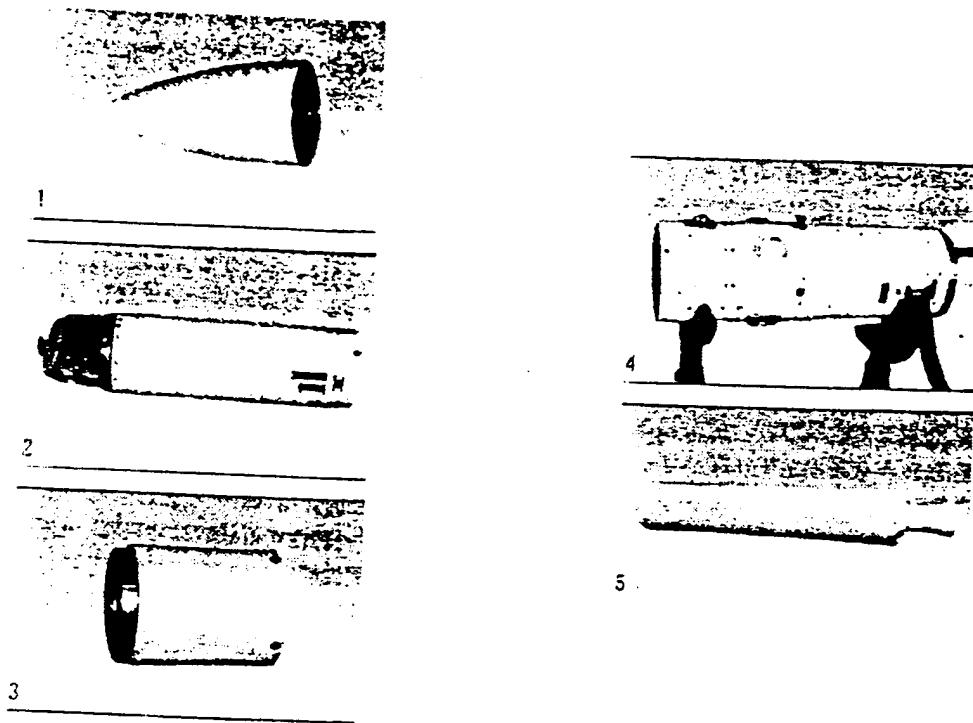


Figure 1. The Chinese-built "*Lieh Ying*" LY-60 Surface-to-air Missile



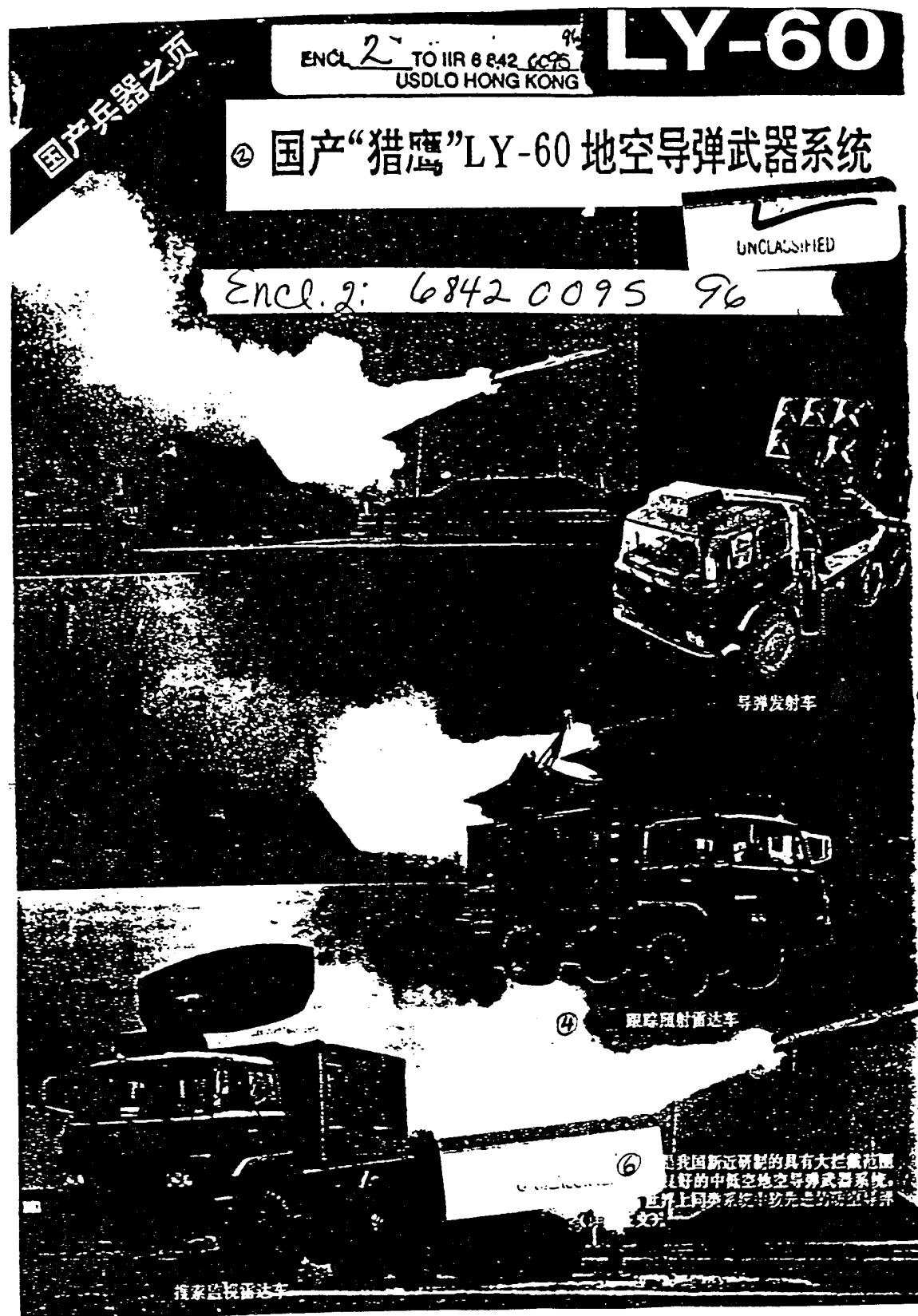
**Figure 2. "Lieh Ying" Missile Components**

1, 2 - Homing modules. 3 - Warhead compartment. 4 - Control module.  
5- Engine compartment.

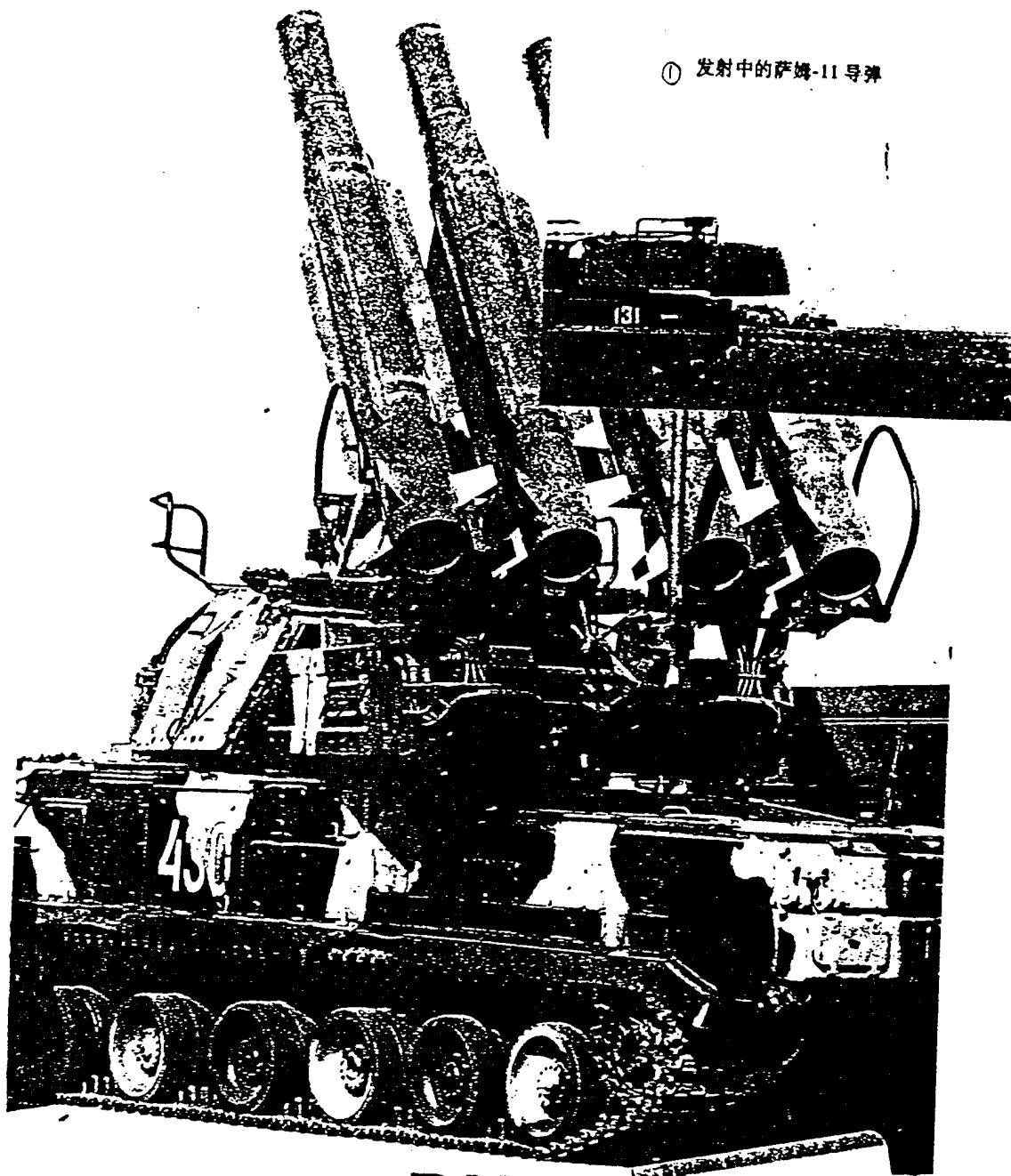
① 附表 “猎鹰”与同类导弹的性能比较

	② 猎鹰(中)	③ 响尾蛇(法)	④ 小檞树(美)	⑤ 萨姆-11(俄)
⑥ 弹长/米	3.89	2.94	2.9	5.5
⑦ 弹径/毫米	⑧ 前部 203 ⑨ 后部 208	156	120	400
⑩ 翼展/毫米	680	547 ⑪ (翼尖突出)	640	860
⑫ 弹重/千克	220	125	86.2	
⑬ 最大速度/马赫	3	2.2	2.5	3
⑭ 最大机动过载/g	35	25		20

Key: (1). Appended chart. A comparison of the properties of *Lieh Ying* with those of similar missiles (2). *Lieh Ying* (China) (3). Rattlesnake (France) (4). Chaparral (United States) (5). SA-11 (Russia) (6). Missile length/meters (7). Missile diameter/millimeters (8). Front end (9). Rear end (10). Wingspan/millimeters (11). (Wings are sharply pointed) (12). Missile weight (kilograms) (13). Maximum speed/Mach number (14). Maximum maneuvering overload/g



**Key:** (1) Chinese-built weapons page (2). The Chinese-built "*Lieh Ying*" LY-60 surface-to-air missile weapon system (3). Missile launching vehicle (4). Tracking beam radar vehicle (5). Search and monitoring radar vehicle (6). The LY-60 is a low-to-middle altitude missile weapon system newly developed by China which has a great interception range and good [covered by classification tag]. It is one of the more advanced missiles of this type in the world. (See text for details.)



① 发射中的萨姆-11导弹

② 萨姆-11导弹发射车

Key: (1). SA-11 missile being fired. (2). SA-11 missile-launching vehicle.

**SA-11 A New-Generation Medium-Range Russian Antiaircraft Missile**  
**(See text for details)**

Russia's SA-11 (BUK) is a medium-range surface-to-air missile weapon system that went into service in the 1980s. The range of the SA-11 fills the firepower gap left by the SA-15 and SA-16. It and the shipborne SA-N-7 form the backbone of Russia's medium-range antiaircraft force.

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